<u>In the claims</u>:

Please substitute the following full listing of
claims for the claims as originally filed or most
recently amended. Claims 2, 28, 55 - 57 and 64 are
canceled without prejudice or disclaimer.

1. (Currently Amended) A central pattern
generator-based system for controlling at least one
mechanical limb, comprising
    at least one mechanical limb;
    <u>a system for phase adjustment of the central pattern</u>
<u>generator based on a sensory trigger in or derived from</u>
<u>sensory feedback;</u> and
    a non-biological central pattern generator that
autonomously generates a rhythmic pattern of commands for
controlling repetitive cyclical movement of the at least
one mechanical limb wherein said commands and said
rhythmic pattern of commands are adapted as a function of
sensory feedback.

2. (Canceled)

3. (Currently Amended) The central pattern
generator-based system of claim 1, ~~including~~. wherein:
    ~~a~~ <u>said</u> system for phase adjustment of the central
pattern generator <u>being</u> based on
    at least one sensory trigger in or derived from
sensory feedback; and
    a system for controlling firing frequency of
motoneurons as a function of the sensory feedback or the
sensory trigger.

4. (Original) The central pattern generator-based system of claim 1, further including at least one memory device.

5. (Original) The central pattern generator-based system of claim 4, wherein the memory device controls adaptation of output from the central pattern generator.

6. (Original) The central pattern generator-based system of claim 5, wherein the output includes integrate-and-fire neurons.

7. (Original) The central pattern generator-based system of claim 1, wherein the system is at least one chip.

8. (Original) The central pattern generator-based system of claim 7, including at least one chip containing electronic analogues of biological neurons, synapses and time-constraints.

9. (Original) The central pattern generator-based system of claim 7, including at least one chip that includes dynamic memories and phase modulators.

10. (Currently Amended) ~~The central pattern generator-based system of claim 1,~~ <u>A central pattern generator-based system for controlling at least one mechanical limb, comprising</u>
      <u>at least one mechanical limb; and</u>
      <u>a non-biological central pattern generator that autonomously generates a rhythmic pattern of commands for controlling repetitive cyclical movement of the at least one mechanical limb wherein said commands and said</u>

rhythmic pattern of commands are adapted as a function of
sensory feedback
        wherein the system is a non-linear oscillator
including electronic analogues of biological neurons,
synapses and time-constraints, dynamic memories and phase
modulators.

        11. (Original) The central pattern generator-based
system of claim 7, wherein the system
includes at least one chip in which components are
integrated with hardwired or programmable circuits.

        12. (Original) The central pattern generator-based
system of claim 1, wherein the central pattern generator
is a distributed system of at least two non-linear
oscillators.

        13. (Original) The central pattern generator-based
system of claim 12, wherein the distributed system
includes at least one neuron phasically coupled to a
neuron or a sensory input.

        14. (Original) The central pattern generator-based
system of claim 12, wherein the distributed system
includes at least two neurons phasically coupled to each
other, to another neuron, or to a sensory input.

        15. (Original) The central pattern generator-based
system of claim 14, wherein phasic coupling is in-phase,
180 degrees out of phase, or any number of degrees out of
phase.

16. (Original)The central pattern generator-based system of claim 14, wherein phasic coupling is based on rhythmic movement application.

17. (Original) The central pattern generator-based system of claim 14, including a phase control circuit.

18. (Original) The central pattern generator-based system of claim 14, including at least one integrate-and-fire spiking motoneuron driven by the phasically coupled neurons.

19. (Original) The central pattern generator-based system of claim 1, including at least one muscle.

20. (Original) The central pattern generator-based system of claim 1, wherein the system is a robot.

21. (Original) The central pattern generator-based system of claim 7, wherein the system includes a central pattern generator chip and at least one biological neuron.

22. (Original) The central pattern generator-based system of claim 21, including multiple chips.

23. (Original) The central pattern generator-based system of claim 1, including at least one sensor for collecting sensory feedback.

24. (Original) The central pattern generator system of claim 23, including a system for phase adjustment of the central pattern generator based on at least one sensory trigger in the received sensory feedback.

25. (Original) The central pattern generator-based system of Claim 1, wherein the sensory feedback is received from the at least one mechanical limb.

26. (Original) The central pattern generator-based system of Claim 1, wherein the sensory feedback is received from a sensing modality.

27. (Currently Amended) A central pattern generator-based system for controlling a biological system for rhythmic movement, comprising
an interface with a biological system that can provide sensory feedback from said biological system;
a system for phase adjustment of the central pattern generator based on a sensory trigger in or derived from sensory feedback; and
a non-biological central pattern generator that autonomously generates a rhythmic pattern of commands for controlling repetitive cyclical movements of the biological system wherein said commands and said rhythmic pattern of commands are adapted as a function of sensory feedback.

28. (Canceled)

29. (Currently Amended) The central pattern generator-based system of claim 27, including: A central pattern generator-based system for controlling a biological system for rhythmic movement, comprising
an interface with a biological system that can provide sensory feedback from said biological system;
a non-biological central pattern generator that autonomously generates a rhythmic pattern of commands for controlling repetitive cyclical movements of the

biological system wherein said commands and said rhythmic
pattern of commands are adapted as a function of sensory
feedback;

a system for phase adjustment of the central pattern
generator based on at least one sensory trigger in or
derived from sensory feedback; and

a system for controlling firing frequency of
motoneurons as a function of the sensory feedback or the
sensory trigger.

30. (Original) The central pattern generator-based
system of claim 27, further including
at least one memory device.

31. (Original) The central pattern generator-based
system of claim 30, wherein the memory device controls
adaptation of output from the central pattern generator.

32. (Original) The central pattern generator-based
system of claim 31, wherein the output includes
integrate-and-fire neurons.

33. (Original) The central pattern generator-based
system of claim 27, wherein the system is at least one
chip.

34. (Original) The central pattern generator-based
system of claim 33, including at least
one chip containing electronic analogues of biological
neurons, synapses and time-constraints.

35. (Original) The central pattern generator-based
system of claim 33, including at least one chip that
includes dynamic memories and phase modulators.

36. (Currently Amended) ~~The central pattern generator-based system of claim 27,~~ A central pattern generator-based system for controlling a biological system for rhythmic movement, comprising
an interface with a biological system that can provide sensory feedback from said biological system;
a non-biological central pattern generator that autonomously generates a rhythmic pattern of commands for controlling repetitive cyclical movements of the biological system wherein said commands and said rhythmic pattern of commands are adapted as a function of sensory feedback;
wherein the system is a non-linear oscillator including electronic analogues of biological neurons, synapses and time-constraints, dynamic memories and phase modulators.

37. (Original) The central pattern generator-based system of claim 33, wherein the system includes at least one chip in which components are integrated with hardwired or programmable circuits.

38. (Original) The central pattern generator-based system of claim 27, wherein the central pattern generator is a distributed system of at least two non-linear oscillators.

39. (Original) The central pattern generator-based system of claim 38, wherein the   distributed system includes at least one neuron phasically coupled to a neuron or a sensory input.

40. (Original) The central pattern generator-based system of claim 38, wherein the   distributed system

includes at least two neurons phasically coupled to each
other, to another neuron, or to a sensory input.

    41. (Original) The central pattern generator-based
system of claim 40, wherein phasic coupling is in-phase,
180 degrees out of phase, or any number of degrees out of
phase.

    42. (Original) The central pattern generator-based
system of claim 40, wherein phasic coupling is based on
rhythmic movement application.

    43. (Original) The central pattern generator-based
system of claim 40, including a phase
control circuit.

    44. (Original) The central pattern generator-based
system of claim 40, including at least   one
integrate-and-fire spiking motoneuron driven by the
phasically coupled neurons.

    45. (Original) The central pattern generator-based
system of claim 27, including at least
one muscle.

    46. (Original) The central pattern generator-based
system of claim 33, wherein the system includes a central
pattern generator chip and at least one biological
neuron.

    47. (Original) The central pattern generator-based
system of claim 46, including multiple chips.

48. (Original) The central pattern generator-based system of claim 27, including at least one sensor for collecting sensory feedback.

49. (Original) The central pattern generator system of claim 48, including a system for phase adjustment of the central pattern generator based on at least one sensory trigger in the received sensory feedback.

50. (Original) The central pattern generator-based system of Claim 27, wherein the sensory feedback is received from the at least one biological limb.

51. (Original) The central pattern generator-based system of Claim 27, wherein the sensory feedback is received from a sensing modality.

52. (Original) A method for controlling a mechanical or biological system for rhythmic movement, comprising:
    (A) measuring sensory feedback to obtain measured sensory feedback;
    (B) processing the measured sensory feedback to obtain data for a plurality of designated parameters; and
    (C) via a central pattern generator-based system, applying a set of rules to the obtained data to generate at least one signal for commanding the limb or biological system for rhythmic movement, wherein the central pattern generator-based system comprises a circuit that mimics a biological central pattern generator.

53. (Original) The method of claim 52, including (D) via the central pattern generator-based system, applying the generated signal to command the limb or biological system for rhythmic movement.

54. (Original) The method of Claim 52, wherein the central pattern generator system comprises a circuit comprising at least two coupled non-linear oscillators.

55. - 57. (Canceled)

58. (Currently Amended) ~~The autonomous movement device of claim 57,~~ The central pattern-based system as recited in claim 27, including at least one mechanical limb.

59. (Original) The autonomous device of claim 58 wherein the limb is a leg, arm, wing or appendage for swimming.

60. (Original) The movement device of claim 58 including at least two limbs.

61. (Currently Amended) ~~The movement device of claim 57,~~ The central pattern-based system as recited in claim 27, wherein the ~~device~~ system is a breathing controller.

62. (Currently Amended) ~~The movement device of claim 57,~~ The central pattern-based system as recited in claim 27, wherein the ~~device~~ system is a pacemaker.

63. (Currently Amended) ~~The movement device of claim 57,~~ The central pattern-based system as recited in claim 27, wherein the ~~device~~ system is a running device.

64. (Canceled)

65. (Currently Amended) A method for modifying a continuous waveform provided by a non-biological central pattern generator, comprising the steps of:

(A) provision of a continuous waveform by a non-biological central pattern generator;

(B) provision of sensory feedback to the non-biological central pattern generator;

~~(C)~~ (C) rule-application by the non-biological central pattern generator to the sensory feedback;

(D) based on the rule-application, determination by the non-biological central pattern generator to modify or maintain the continuous wave form.

66. (Original) The method of claim 65, wherein the non-biological central pattern generator modifies the wave form.

67. (Original) The method of claim 65, wherein the rule-application is the application of adaptive ring rules.